DETAILED ACTION

Status

This communication is in response to the amendment filed on December 30, 2009.

Claims 72-76, 79-86, 89-102, 105-111, 114-135, and **138-142** (renumbered as **claims 1-61**) are allowed in this Office action.

Examiner's Amendment

An Examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to the Applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this instant Examiner's amendment was given in a telephonic communication (see attached Interview Summary) from Applicant's attorney Franco Serafini on April 28, 2010.

The claims are amended as presented below:

Claims 1-71. (Canceled)

Claim 72. (Currently Amended) A computerized method for projecting information data from a multidimensional space onto a space having fewer dimensions, comprising:

receiving a database of N-dimensional data in the form of records having a certain number of variables;

defining a metric function for calculating a distance between each record and all the other records in the database;

calculating a matrix of distances between each record and all the other records in the database using said metric function;

defining a N-1 dimensional space in which each record is defined by N-1 coordinates;

calculating the N-1 coordinates of each record in the N-1 dimensional space using an evolutionary algorithm applied to all the records in the database at the same time;

defining a best projection of the records onto the N-1 dimensional space as a projection in which a distance matrix between each record and all the other records in the N-1 dimensional space best fits or has minimum differences with the distance matrix of the records calculated in the N-dimensional space, and

outputting said best projection of the records to a user,

wherein said receiving, defining, calculating and outputting are performed by a data processor, and

wherein said evolutionary algorithm comprises combinatory criteria that include marriages, causing two parent records to combine their sets of data, and mutations, causing erroneous self-replications of records,

wherein at least a number of marriages and of mutations of individuals are adaptive self-definable internal variables,

wherein a hidden point is defined which corresponds to a hidden record or to a hidden variable whose existence is only guessed at, said hidden point is added to the parent population by giving it position coordinates X_{hi} and Y_{hi} in the projection, and

wherein the calculation of the evolutionary algorithm is carried out in parallel with and without the hidden point and wherein best fit projections obtained from said two parallel calculations are compared.

Claims 73-76. (Previously Presented)

Claim 77-78. (Canceled)

Claims 79-81. (Previously Presented)

Claim 82. (Currently Amended) A computerized method for the cognitive analysis of multidimensional information data, comprising:

receiving a database with a certain number of records, each record comprising a certain number of variables and ~~being~~ is relative to a N-dimensional space;

projecting the database onto a space having a lesser number of dimensions relative to the N-dimensional space, considering the records as points and the variables as coordinates, or the variables as points and the records as coordinates;

carrying out said projection using an algorithm for projecting information data belonging to a multidimensional space into a space having lesser dimensions by:

calculating a matrix of distances between each point defined by a record or a variable of the database and each other point using a metric function;

defining a N-1 dimensional space in which each point represented by a record or a variable is defined by N-1 coordinates;

calculating the N-1 coordinates of each point in the N-1 dimensional space using an evolutionary algorithm applied to all the points in the database at the same time; and

generating a best projection in which the distance matrix of the points in the N-1 dimensional space best fits or has minimum differences with the distance matrix of the points calculated in the N-dimensional space as the best projection of said points onto the N-1 dimensional space; and

outputting said best projection to a user,

wherein said receiving, projecting and carrying out are performed by a data processor,

wherein said evolutionary algorithm comprises combinatory criteria that includes marriages, causing two parent records to combine their sets of data, and mutations, causing erroneous self-replications of records, ~~and~~

wherein at least a number of marriages and of mutations of individuals are adaptive self-definable internal variables,

wherein a hidden point represented by a hidden record or a hidden variable can be defined, which corresponds to a hidden point on the map and whose existence is only guessed at, said hidden point is added to the parent population by giving it position coordinates X_{hi} and Y_{hi} in the projection, and

wherein the calculation of the evolutionary algorithm is carried out in parallel, with and without the hidden point, and best fit projections obtained from said two parallel calculations are compared.

Claims 83-86. (Previously Presented)

Claims 87-88. (Canceled)

Claims 89-98. (Previously Presented)

Claim 99. (Currently Amended) A computerized method for generating two or three dimensional maps of geographic sites starting from a database containing relative distances between the sites, comprising:

organizing the known or measured distance values between each of the geographical sites and all the other geographical sites in a matrix form;

defining a two or a three dimensional space in which the position of each site is uniquely defined by two or three coordinates;

determining the positional coordinates of each geographical site in the two or three dimensional space using an evolutionary algorithm applied to the entire database at the same time;

determining the distances of the geographical sites one from the other using the calculated two or three dimensional positional coordinates of said geographical sites one from the other;

generating a matrix of distances with distance values determined according to the preceding step;

defining as the best set of two or three dimensional coordinates of position of the totality of the geographical sites in the two or three dimensional space, the two or three dimensional coordinates of position of the said geographical sites for which the distance matrix determined therefrom best fits or has a minimum difference with the distance matrix of the known or measured distance values of the geographical sites; and

outputting said best set of coordinates of position to a user,

wherein said organizing, defining, determining and outputting are performed by a data processor, wherein said evolutionary algorithm comprises combinatory criteria that include marriages, causing two parent records to combine their sets of data, and mutations, causing erroneous self-replications of records, ~~and~~

wherein at least a number of marriages and of mutations of individuals are adaptive self-definable internal variables,

wherein at least one hidden or hypothetical geographical site is added to the database of geographical sites of which neither the coordinates nor the distances are

known and wherein a first and a second set of coordinates for said at least one geographical site are freely defined, and

wherein the calculation of the evolutionary algorithm is carried out in parallel for the database with and without the hidden or hypothetical geographical site, and wherein the best fit set of positional coordinates of the totality of geographical sites obtained by said two parallel calculations are compared.

Claim 100. (Currently Amended) The method of claim [[98]] 99, wherein the evolutionary algorithm is a genetic algorithm.

Claims 101-102. (Previously Presented)

Claims 103-104. (Canceled)

Claim 105. (Currently Amended) The method of claim [[98]] 99, wherein an additional pre-processing or post-processing phase is provided.

Claim 106. (Currently Amended) [[A]] The method according to claim 105, wherein in a preventive phase the known distance data matrix is subjected to treatment by means of a Self Organizing Map (SOM) algorithm, and wherein the clusters formed by said SOM algorithm in the different units are then projected into said lesser dimensional space.

Claim 107. (Previously Presented)

Claim 108. (Currently Amended) A computerized method for representing the structure of a molecule in a three dimensional or two dimensional space by indicating only the relative distances of at least part of the atoms of the molecule relative to one another, comprising:

a) organizing known or measured distance values of all of the atoms from one another in a matrix form;

b) defining a two or a three dimensional space in which the position of each atom is uniquely defined by two or three coordinates;

c) determining the two or three coordinates of the position in the two or three dimensional space of each atom with an evolutionary algorithm applied to all of the atoms at the same time;

d) determining the distances of each of the atoms one from all of the other atoms through the calculated two or three dimensional coordinates of position of the atoms one from the other;

e) generating a matrix of distances with distances determined according to (d); and

f) defining as the best set of coordinates two or three dimensional coordinates of position of the totality of the atoms in the two or three dimensional space, the two or three dimensional coordinates of position of the atoms for which the distance matrix

determined therefrom best fits, or has a minimum difference, with the distance matrix of the known or measured distance values of the atoms; and

g) outputting said best set of co-ordinates to a user,

wherein said organizing, defining, determining, generating and outputting are performed by a data processor, wherein said evolutionary algorithm comprises combinatory criteria that include marriages, causing two parent records to combine their sets of data, and mutations, causing erroneous self-replications of records, ~~and~~

wherein at least a number of marriages and of mutations of individuals are adaptive self-definable internal variables,

wherein at least one hidden or hypothetical atom is added to a database of geographical sites of atoms of the molecule of which neither the coordinates nor the distances are known and a first and a second set of coordinates for said at least one atom are freely defined, and

wherein the calculation of the evolutionary algorithm is carried out in parallel for the database provided with and without the at least one hidden or hypothetical atom and the best fit set of coordinates of position of the totality of the atoms obtained by the two parallel calculations and compared.

Claims 109-111. (Previously Presented)

Claims 112-113. (Canceled)

Claims 114-115. (Previously Presented)

Claim 116. (Currently Amended) The method of claim [[112]] 108, used to determine the presence and/or position of at least an unknown or hidden atom in the structure of the molecule.

Claims 117-119. (Previously Presented)

Claim 120. (Currently Amended) [[A]] The apparatus according to claim 118, wherein said evolutionary algorithm is a genetic algorithm.

Claim 121. (Currently Amended) [[An]] The apparatus according to claim 118, wherein said subroutine provides for:

encoding each individual record or variable represented by a point having coordinates X and Y;

defining a global set of different X and Y coordinates for each point forming a first population of projections solution onto the less dimensional space, usually a two or three dimensional space;

calculating the fitness score for each of the projections of this first population by using as the fitness function the matrix of distances of the single points in the originally N dimensional space;

subjecting the population of projections to combination according to certain combination rules thus producing a first generation population of projections which

comprises X and Y coordinates for the points which are a combination of the coordinates provided in two projections of the parent generation; and

calculating the fitness score of the projections of the first generation and forming again a new generation basing on the first generation.

Claim 122. (Currently Amended) [[An]] The apparatus according to claim 118, wherein the genetic algorithm is the GenD algorithm.

Claim 123. (Currently Amended) [[An]] The apparatus according to claim 118, wherein a hidden point can be defined which corresponds to a hidden record or ~~a~~ to a hidden variable whose existence is only speculative, and wherein said hidden point is added in the parent population by giving it positional coordinates ~~Xhi~~ X_{hidden} and ~~Yhi~~ Y_{hidden} in the projection.

Claim 124. (Currently Amended) [[An]] The apparatus according to claim 118, wherein the calculation of the evolutionary algorithm is carried out in parallel with the hidden point and without the hidden point and the best fit projections obtained by the two parallel calculations are compared.

Claim 125. (Currently Amended) [[An]] The apparatus according to claims 118, further comprising:

providing a database comprising a certain number of records each one characterized by a certain number of variables;

elaborating the database alternatively or in parallel according to:

a first manner in which the records are considered as being points and the variables as being the coordinates of the points; and

a second manner in which the variables are considered as being points and the records are the coordinates.

Claim 126. (Currently Amended) [[An]] The apparatus according to claim 118, further comprising a different treatment of the data as a pre or post processing phase.

Claim 127. (Currently Amended) [[An]] The apparatus according to claim 126, wherein the data is processed in a preventive step by means of a Self Organizing Map (SOM) algorithm, the clusters formed by said SOM algorithm in the different units then being projected onto said space of fewer dimensions.

Claim 128. (Currently Amended) [[An]] The apparatus according to claim 117, wherein a relationship between the collected data records of the collected data is determined via the distance of each data record from the other data records and wherein said distance is used as a relevance weight for each data record in determining the activation or deactivation of one or more of the means for carrying out mechanical, physical and/or chemical actions.

Claim 129. (Currently Amended) [[An]] The apparatus according to claim 128, wherein a maximum distance for each data record from the other is set for

discriminating the data records to be used in determining the activation or deactivation of one or more of the means for carrying out said mechanical, physical and or chemical actions.

Claim 130. (Currently Amended) [[An]] The apparatus according to claim 128, wherein the clustering or distance of the data records on the map onto which the database has been projected is used as a measure of similarity of the data records or of the variables related to the data records.

Claim 131. (Currently Amended) Apparatus having artificial intelligence containing a simulation of intuitive behavior, comprising:

a ~~processing unit~~ computer processor connected to each of a data memory and a program memory, wherein the ~~processing unit~~ processor is further connected to one or more sensors for detecting or measuring different physical and/or chemical conditions or effects or processes characterizing or occurring in the environment;

wherein the ~~processing unit~~ processor is further connected to data input means through a service person or a data input line from other data collecting apparati;

wherein the ~~processing unit~~ processor is further connected to means for carrying out mechanical, physical or chemical actions;

wherein the program memory stores a program executable by the ~~processing unit~~ processor, said program including a routine for driving the sensors and saving in a uniquely recognizable way each datum collected by the sensors and/or for saving data

input by a service person or by other apparati, driver for activating or deactivating the means for carrying out mechanical, physical or chemical actions;

wherein the program stored in the program memory further comprises means for evaluating data collected by the sensors and/or inputted by a service person or by other apparati;

and wherein in operation the apparatus:

generates from the collected and/or inputted data a database with a certain number of records each one comprising a certain number of variables, which are relative to a N-dimensional space;

projects the database considering the record as points and the variables as coordinates or the variables as points and the records as coordinates onto a space having a reduced number of dimensions relatively to the N dimensional space, said projection ~~being~~ is carried out with an algorithm for projecting information data belonging to a multidimensional space into a space having fewer dimensions comprising:

calculating a matrix of distances between each point defined by a record or a variable of the database from each other point through a metric function;

defining a N-1 dimensional space in which each point represented by a record or a variable is defined by N-1 coordinates;

calculating the N-1 coordinates of each point in the N-1 dimensional space with an evolutionary algorithm applied to all the points in the database at the same time; and

defining as the best projection of the points onto the N-1 dimensional space the projection in which the distance matrix of the points in the N-1 dimensional space best fits or has minimum differences with the distance matrix of the points calculated in the N-dimensional space,

wherein said evolutionary algorithm comprises combinatory criteria that include marriages, causing two parent records to combine their sets of data, and mutations, causing erroneous self-replications of records, ~~and~~

wherein at least a number of marriages and of mutations of individuals are adaptive self-definable internal variables,

wherein a hidden point represented by a hidden record or a hidden variable is definable, which corresponds to a hidden point on the map whose existence is only speculated, and wherein said hidden point is added to the parent population by giving it positional coordinates X_{hi} and Y_{hi} in the projection, and

wherein the calculation of the evolutionary algorithm is carried out in parallel with and without the hidden point and wherein the best fit projections obtained by the two parallel calculations are compared.

Claims 132-135. (Previously Presented)

Claims 136-137. (Canceled)

Claims 138-142. (Previously Presented)

Summary of Related Prior Arts

The prior arts on record are summarized as follows:

i) Agrafiotis et al. (*Pub. No. US 2002/0091655*) teaches mapping n-dimensional input patterns into an m-dimensional space so as to preserve relationships that may exist in the n-dimensional space. A subset of the input patterns is chosen and mapped into the m-dimensional space using an iterative nonlinear mapping process. A set of locally defined neural networks is created, then trained in accordance with the mapping produced by the iterative process.

ii) Shmulevich et al. (*Pub. No. US 2003/0225718*) teaches include the development of computational tools for the identification and discovery of potential targets for therapeutic intervention as well as establishing and modeling a regulatory relationship between nodes of a network, and more particularly to establishing and modeling a regulatory relationship between nodes of a biological network using Probabilistic Boolean Networks modeling of complex systems, which include, but are not limited to gene regulatory networks, biological systems, and the like.

iii) Blaney (*Pat. No. US 5,680,331*) teaches generating multiple mimics of an active site of a molecule, such as a protein, using computer modeling of the active site and generating many different possible representations of the active site of the selected

protein, presenting the user with a choice of premodeled molecules for synthesis and testing as a substitute for the protein.

iv) Granger (*Pat. No. US 6,463,321*) teaches producing a characterizing ERP signal vector for a patient. Projections based on the characterizing ERP signal vector are then generated. The projections are compared to information derived from the ERP data of patients having known neurological conditions. The projections are compared to standards, such as one or more characterizing ERP signal vectors from known healthy patients, and one or more characterizing ERP signal vectors from patients known to have the disorder. The probable presence or absence of the neurological disorder is decided by a weighted vote of the projections, where the weighting is a function of how closely each projection compares to the respective standards

v) Schipper (*Pat. No. US 5,581,259*) teaches determining the present location coordinates of a user moving in a two-dimensional or three-dimensional space, with reference to an old map that may be inaccurate. Location coordinates $(x_{i'},y_{i'})$ of two or three non-collinear landmarks in two dimensions), or coordinates $(x_{i'},y_{i'},z_{i'})$ of three or four non-coplanar landmarks (in three-dimensions), are indicated on the old map. Two or more locations are computed on the old map for which the range $R_{i'}$ from landmark number i to this old map computed location is also equal to R_i, and one of these computed locations is designated as the user location on the old map.

Reasons for Allowance

The following is an examiner's statement of reasons for allowance of **claims 72-76**, **79-86**, **89-102**, **105-111**, **114-135**, and **138-142**:

The prior arts of record fail to teach the limitations of:

"*wherein said evolutionary algorithm comprises combinatory criteria that include marriages, causing two parent records to combine their sets of data, and mutations, causing erroneous self-replications of records,*

wherein at least a number of marriages and of mutations of individuals are adaptive self-definable internal variables,

wherein a hidden point is defined which corresponds to a hidden record or to a hidden variable whose existence is only guessed at, said hidden point is added to the parent population by giving it position coordinates X_{hi} and Y_{hi} in the projection, and

wherein the calculation of the evolutionary algorithm is carried out in parallel with and without the hidden point and wherein best fit projections obtained from said two parallel calculations are compared" (**independent claims 72, 82, 99, 108,** and **131**).

Claims 73-76, 79-81, 83-86, 89-98, 100-102, 105-107, 109-111, 114-130, 132-135, and **138-142** are also allowed based on their dependencies on **claims 72, 82,99, 108**, and **131** respectively.

Any comments considered necessary by the Applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should

preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Son T. Hoang whose telephone number is (571) 270-1752. The Examiner can normally be reached on Monday – Friday (7:00 AM – 4:00 PM).

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Neveen Abel-Jalil can be reached on (571) 272-4074. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. T. H./
Examiner, Art Unit 2165
April 28, 2010

/Neveen Abel-Jalil/
Supervisory Patent Examiner, Art Unit 2165